

FIFTEENMILE BASIN
HABITAT IMPROVEMENT PROJECT

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ABSTRACT

The Fifteenmile Basin Habitat Improvement Project is an **ongoing** multi-agency effort to improve habitat in the Fifteenmile drainage and increase production of the depressed wild. winter steelhead run. Cooperating agencies include the Oregon Department of Fish and Wildlife, USDA Forest Service. USDA Soil Conservation Service and Bonneville Power Administration. in consultation with the Confederated Tribes of Warm Springs.

The Oregon Department of Fish and Wildlife is administering project work on state and private lands and the U.S.D.A. Forest Service is administering project work on National Forest land. Project work on the Forest **has been** sub-divided into four components; 1) Ramsey **Creek** 2) Eightmile Creek 3) Fifteenmile Creek 4) Fivemile Creek.

Forest Service activities in the Fifteenmile basin during 1988 involved habitat improvement work on Ramsey Creek, continuation of physical and **biological monitoring**, collection of spawning survey information. and macroinvertebrate sampling. The primary project objective on Ramsey Creek was to increase juvenile rearing habitat for 1+ steelhead. A total of 48 log structures including sills, diggers. wings and diagonal series were constructed in two project areas.

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INTRODUCTION

The Fifteenmile project is a multi-year fish habitat improvement effort aimed at increasing the wild run of winter steelhead in the basin. Cooperators in this enhancement program include the Oregon Department of Fish and Wildlife (ODFW), USDA Forest Service, Mt. Hood National Forest (Forest Service), in consultation with the Confederated Tribes of Warm Springs, enhancement program in the Fifteenmile Basin. The majority of the project is funded by the Bonneville Power Administration under the Northwest Power Planning Council's Fish and Wildlife program (Measure 703(C), Action Item 4.2). Fifteenmile Creek and the major tributaries, Eightmile Creek, Ramsey Creek and Fivemile Creek support the easternmost population of wild winter steelhead trout in the Oregon portion of the Columbia River Basin. The winter steelhead run is very depressed relative to historic levels and estimated potential production levels (Smith, et al, 1987).

Past enhancement efforts in the basin have included construction of instream structures and passage improvements, including an ODFW project to improve passage at a falls at the mouth of Fifteenmile Creek and Forest Service projects to provide passage at two culverts on Ramsey Creek. The Forest Service has also completed a road rehabilitation project on Fivemile and Ramsey Creeks to improve watershed conditions. Instream structures were placed in Ramsey Creek in 1986, 1987 and 1988 on the National Forest with BPA funds. Forest Service funds were used for project work in Eightmile Creek, within the area of Eightmile Campground, in 1987. The ODFW and USDA Soil Conservation Service were involved in rehabilitation of private agricultural lands following the 1974 flood. The Forest Service and ODFW have also been conducting spawning surveys, stream habitat surveys, and population surveys to better estimate current and potential anadromous fish production.

Tasks identified to be completed under the 1988 work statement with BP4 included:

Ramsey Creek

1. Complete installation of instream structures between river mile (RM) 8.3 and 11.4. Plans include approximately 70 structures (log sills, wings, cover logs) to be constructed by a small track-mounted backhoe. Hand crews will build structures (primarily wings and cover logs) at approximately 25 sites where machine access is limited.
2. Maintain structures installed and completed in 1986 and 1987.
3. Continue pre and post-project monitoring to document changes in fish habitat as a result of project work.
4. Conduct post treatment peer review of Ramsey Creek to insure all opportunities for habitat improvement have been identified and habitat objectives for the stream have been met. Review team will include other Mt. Hood National Forest biologists, ODFW biologists, and a biologist for the Confederated Tribes of Warm Springs.

Fifteenmile Creek

1. Complete project planning and environmental analysis report for habitat improvement work in the mainstem Fifteenmile from the Forest Boundary to the upper limit of potential anadromous fish production.

Fivemile Creek

1. Complete project planning and environmental analysis report for habitat improvement work in the mainstem Fivemile Creek from the National Forest boundary upstream to the confluence of the Middle and South Forks of Fivemile.

Basin-wide

1. Conduct spawning surveys on National Forest land as relative indicator of population status and trends.
2. Continue macroinvertebrate monitoring. Coordinate with ODFW, sending samples to Dr. Fred Mangum - USDA Forest Service. Region 4 for analysis.
3. Continue water temperature monitoring.

DESCRIPTION OF PROJECT AREA

Fifteenmile Creek is a fifth-order tributary to the Columbia River, entering the Columbia just downstream of The Dalles Dam. Fifteenmile Creek drains the northeast corner of the Mt. Hood National Forest. The upper third of Fifteenmile Creek and the above mentioned tributaries flow through National Forest land, while the lower reaches of the streams flow through private agricultural land. Fish habitat on National Forest land is generally rated as fair to good. Negative factors influencing habitat capability include low flow rearing habitat, locally limited spawning habitat, irrigation diversions, siltation and passage obstructions. Anadromous fish habitat on the private agricultural land is severely limited by irrigation diversions, a lack of rearing habitat, poor spawning habitat, siltation, and high summer water temperatures. A detailed description of the basin and discussion of limiting factors may be found in the Fifteenmile Basin Implementation Plan (Smith et al, 1987).

The Forest Service portion of the Fifteenmile Basin Project has been divided into four components.

- 1) Ramsey Creek
- 2) Eightmile Creek
- 3) Fifteenmile Creek
- 4) Fivemile Creek

Ramsey Creek

Ramsey Creek is a third-order tributary to Fifteenmile Creek. The mouth is approximately 7.5 miles downstream of the National Forest Boundary. Project work on Ramsey Creek has been concentrated between RM 7.5-11.4. According to a Forest Service stream survey (Kinzey and Hutchinson. 1985), average fish habitat condition is rated as fair to moderate throughout the project area. Although there is a fairly balanced pool:riffle ratio (P:R= **4:6**), existing pools are shallow with little effective cover. Twenty percent of total gravels are of suitable size class for anadromous spawning.

Shallow pool depth, little effective cover, and overall lack of diversity are limiting factors for rearing 1+ steelhead. Poor juxtaposition of pools to spawning gravels and several debris jams that could be migration barriers are other factors limiting fish production. Pool formation and gravel collection in Ramsey Creek is dependant upon large woody debris. Past debris removal appears to have been a **major** factor in the degraded fish habitat between RM 7.5-11.4.

The objectives of improvement work are to increase the pool:riffle ratio to at least **50:50**, increase effective cover and suitable spawning gravels, and improve passage at debris jams.

Eightmile. Fifteenmile. Fivemile Enhancement

Eightmile **Creek** is a fourth-order tributary to Fifteenmile **Creek**, entering the mainstem below the National Forest boundary at about RM 2.7 of Fifteenmile Creek. The probable upstream limit of potential anadromous fish habitat is approximately RM **31.5**. Fish habitat **in** Eightmile Creek is generally good within the National Forest boundary. Anadromous fish production potential appears to be limited by passage obstructions (log jams), locally poor low-flow rearing habitat, and an unscreened irrigation diversion.

An instream habitat improvement project was done at Eightmile Campground (RM **29.5**) in **1987**. Objectives were to increase pool area and volume, and also increase habitat diversity and cover. Twenty-nine sites included construction of 25 log structures and placement of approximately 40 boulders. The project was funded by the Forest Service with money generated by adjacent timber sales under the KV Act. Additional project work is scheduled in 1989, also using **KV** funds.

Anadromous fish habitat condition **on the** National Forest portion of Fifteenmile Creek is generally rated as good, although habitat capability is suspected to be locally limited **by** the quality of spawning and rearing habitat. Fish habitat below the National Forest boundary is generally poor, as is true for the other streams in the basin. Below the Forest boundary, habitat is degraded by lack of instream structure, siltation, and poor riparian cover which has resulted in high summer water temperatures.

Habitat improvement is planned for Fifteenmile Creek in 1989. It is anticipated that treatment will include falling and blasting trees into the channel to increase instream cover, habitat diversity, and improve the

distribution of spawning gravel. It is anticipated that approximately 80 structures in a three mile section will achieve the above goals.

Fivemile Creek is the northernmost tributary of the Fifteenmile system. Fivemile enters Eightmile Creek approximately **1.5** miles above the Eightmile/Fifteenmile confluence. The lower **18.2** miles of Fivemile Creek flow through private land. The confluence of the Middle and South Fork Fivemile is just upstream of the National Forest boundary at RM **18.4**. The North Fork Fivemile enters Fivemile Creek below the Forest boundary and is intermittent on National Forest land.

Anadromous fish habitat on Fivemile is rated poor to fair. **Mjor** limiting factors appear to be low summer discharge, poor pool quality (shallow depth, little effective cover), and sparse spawning gravels. Irrigation withdrawals completely dewater the stream channel **about** two miles below the National Forest boundary for most of the summer. Future project **work** involving the addition of structures will provide low flow pool habitat and cover.

METHODS AND MATERIALS

Spawning Surveys

Spawning surveys on Fifteenmile, Ramsey, and Eightmile Creeks were conducted in May **1988**. Each stream was walked and redds and adult fish were **tallied**. Juveniles were counted where applicable and the presence of resident trout noted. Physical conditions such as relative flow, visibility, and weather were noted. Air and water temperatures were also measured.

Macroinvertebrate Sampling

The Forest Service and ODFW, in **1986**, contracted with Dr. Fred Mangum (Aquatic Ecologist, USDA Forest Service, Region 4), to establish **a macroinvertebrate** sampling program in the Fifteenmile Basin. Macroinvertebrates respond more rapidly than fish populations to **changes in water** quality. Monitoring changes of macroinvertebrate populations should be a good indicator of **changes in** aquatic habitat as a result of habitat improvement work.

The Forest Service sampled sites on National Forest land and ODFW sampled sites on private land. Samples were collected two times in **1988: early spring** and during summer low flow. A fall sample was not collected due to scheduling conflicts and loss of access to the sites due to snow. According to Dr. Mangum, it is best to sample in spring, summer, and fall for several years to develop baseline information. He added that the loss of the fall sample was not critical. Sampling will continue in **1989**. Sampling procedures and site locations are similar to those described in the **1986 annual report** (MacDonald and Hutchinson, **1987**).

Thermographs

Summer water temperatures in the lower portions of the Fifteenmile drainage can reach and maintain high levels. Temperatures in the **80 F** range are common and a temperature of **85 F** was recorded near the mouth of Fifteenmile Creek in **1986**. An objective of the Fifteenmile project is to improve riparian vegetation cover to lower summer water temperatures to **70 F** at the mouth. Thermographs were placed throughout the basin in efforts **to monitor** temperature **changes** (Figure 2).

Oregon Department of Fish and Wildlife placed two thermographs in Fifteenmile Creek and one each in Eightmile and Ramsey Creeks. Water temperatures were monitored through October. The Forest Service placed thermographs in **the** headwaters and at the National Forest boundary on Fifteenmile, Eightmile, and Ramsey Creeks. A thermograph was placed at the National Forest boundary on Fivemile Creek. Water temperatures were also monitored from May through October on National Forest lands.

Omnidata Datapod recorders were used at all sites except for the headuntrl~ site on Ramsey Creek and on lower Eightmile Creek. Peabody-Ryan **thermographs** were used in these two locations.

Physical and Biological Sampling

Project monitoring was continued for the third year on the National Forest. The objective of the monitoring is to gather baseline information on fish habitat in the basin, to monitor post treatment results. help identify limiting factors. and prioritize streams and reaches for habitat improvement. **A full** description of the monitoring procedures and results is contained in the Mt. Hood **1988** National Forest monitoring report.

Project Implementation

The objective of this project is to increase rearing habitat capability **by** improving habitat diversity with instream structures (logs and boulders). The focus is to increase low flow pool/glide volume and effective cover for 1+ and older winter steelhead. The instream structures are designed to create scour and plunge pools, accumulate spawning gravels. and provide cover.

Project work was completed under a Forest Service administered equipment rental contract. The contract specified a small track-mounted backhoe/excavator equipped with an opposable thumb along with an operator. The machine retained by the contract. a John Deere 70, was fully capable of moving the necessary logs and excavating the channel. The opposable thumb is very helpful in placing logs and boulders. Forest Service personnel directed the operator during construction and performed necessary hand labor.

Logs for construction were obtained from adjacent timber stands. Trees were pre-selected and then felled, limbed, and bucked to length by a professional faller. Typical dimensions of logs used was 20 feet in length and 24-36 inches in diameter. Care was exercised so as not to diminish the potential for long term woody-debris input. The logs were skidded to sites with the backhoe.

Structures included log sills, diagonals, digger logs, "V" structures and diagonal log series. Log sills were placed either perpendicular to the flow or at 30-40 degree angles. The function of the sills was to create downstream plunge pools, collect gravel. or provide a downstream control to raise pool depth associated with an upstream structure. Since plunge and scour pools are considered more productive for steelhead rearing than backwater pools, it was important to ensure that sills acting as downstream controls were not placed too high. Diagonal sills functioned the same as perpendicular sills. but were used to "divert" flows in a desired direction to concentrate low flow or enhance a natural condition such as an undercut bank.

Sills were generally anchored five to six feet into both banks for stability and excavated ends were rip-rapped. The upstream sides of the sills were allowed to seal naturally. Plunge pools were excavated downstream of the sills to hasten pool development. Spoils from excavation were used to rip-rap silt ends and protect excavated banks. Large boulders were usually placed in excavated pools to provide additional cover.

Digger logs were anchored into the banks in the same manner as log sills. Instead of being placed in the low flow channel, diggers were constructed to bridge the low flow channel but force higher flows under the log to create a scour pool and provide overhead cover.

Several upstream "V" structures were constructed to create plunge pools. The structures are made from two logs angled upstream at approximately 45 degrees from each bank, meeting in the middle. The vertex is lower in elevation than the ends to concentrate flow. The logs were joined with angle iron and lag bolts .

Dense alder thickets in the project area restricted movement of the backhoe resulting in a slower production rate and posing a hazard to the operator. It was agreed to let the contractor brush a road in the project area with a small bull dozer. This increased production significantly and resulted in a savings on the backhoe contract (which was at an hourly rate). The backhoe was used to pull material onto the road and close it following the instream work. The areas that were brushed are expected to recover rapidly.

RESULTS AND DISCUSSION

Ramsey Creek Project Implementation

Approximately 48 structures were installed in two project areas in Ramsey Creek in 1988. Structures included log sills, digger logs, wings, upstream "V"s, and boulder placements. Two debris jams were modified to improve passage.

All tasks were completed except for the hand work. The availability of work crews and closures due to fire season delayed this portion of the project. The use of a hand crew may not be necessary, as the work may be accomplished by felling trees directly into the channel.

Spawning Surveys

Spawning surveys were conducted on Fifteenmile, Ramsey, and Eightmile Creeks in 1988. The surveys were conducted on May 3 and 4, and included 0.7 miles on Fifteenmile, 1.0 mile on Ramsey, and 0.5 miles on Eightmile. No redds or adult fish were observed. The narrow scope of the surveys, in terms of time and distance, may account for the lack of sightings. In past years the surveys were typically conducted on more than one day per stream and included more survey areas. In 1989, survey reaches will be formalized and a schedule developed to survey each reach more than once.

Macroinvertebrate Analysis

The 1988 report from the macroinvertebrate analysis lab at Brigham Young University is presently unavailable although results from the 1987 report have been received (Appendix B). The five sample sites on the National Forest indicate a good to excellent Biotic Condition Index (BCI) (Mangum, 1987). On lands below the National Forest, the BCI ranges from poor to good. The BCI is an index that reflects the condition of aquatic, riparian, and sometimes terrestrial habitat. Sections of stream that have a poor BCI are indicative of a habitat which has been degraded below its potential capacity to produce diverse aquatic communities and support fish populations.

Water Temperature Monitoring

Water temperature results for 1988 are still being analyzed and will be available for the final draft. Results from 1986 and 1987 show that water temperatures leaving the National Forest throughout the Fifteenmile Basin are quite cool. The highest temperature recorded for either year was on Fifteenmile Creek. In July of 1987, the maximum water temperature was 18.0 C (64.4 F) but this was only for one day (monthly average was 13.1 C). Eightmile, Ramsey and Fivemile Creeks had maximum temperatures of 14.0, 15.5 and 15.5 C, respectively (Appendix D).

Continuous data for the entire monitoring period was not possible due to thermograph failure (Data Pods and Ryan-Peabodys), stolen thermographs, and problems with the temperature analysis program. The majority of data is complete except for Eightmile Creek at the lower station.

Physical and Biological Monitoring

Results of the physical and biological monitoring may be found in the Mt. Hood National Forest Monitoring Report in the Appendix (Ober and Forsgren, 1988).

SUMMARY AND CONCLUSIONS

Ramsey Creek

The habitat improvement program on Ramsey Creek was completed in 1988. A total of 3.9 miles of stream (RM 7.5 - 11.4) has been treated from 1986-1988. Approximately 70 structures were installed using logs and boulders and passage was improved at five debris jams. In addition to the work funded by BPA, Forest Service funds were used to improve passage at two road culverts. The culvert at RM 8.5 was pulled and the road was closed, and the culvert under Rd 4450 was fitted with baffles to improve passage. Additional opportunities are limited and could be as simple as falling trees directly into the channel.

Spawning surveys and project monitoring were completed in Ramsey Creek. Monitoring included quantification of physical habitat throughout the stream

Fifteenmile. Eightmile and Fivemile Creeks

Spawning surveys and baseline monitoring of habitat and production were completed. The monitoring consisted of physical habitat measurements. Macroinvertebrate samples were collected two times during the year and sent to Fred Mangum for analysis. Results from the 1987 macroinvertebrate study are included in the Appendix.

The planning and environmental analysis reports for Fifteenmile and Fivemile were not completed in 1988. The planning is scheduled for the spring of 1989 and the environmental analysis and work plan will follow in late spring. Implementation of the Fifteenmile Creek project is scheduled for implementation in 1989, along with a project on Eightmile Creek using Forest Service KV funds. The Fivemile Creek project is scheduled to be implemented in 1990.

SUMMARY OF EXPENDITURES

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- A. Photos of Ramsey Creek Implementation
- B. Data Macroinvertebrate Analysis
- C. Spawning Survey Data
- D. Temperature Data
- E. Literature Cited

USFS TEMPERATURE DATA
1987
(`C)

Fifteenmile Creek
(At Upper Site)

MONTH	MAX	MIN	AVE
MAY (28-31)	5.5	2.0	3.7
JUNE	10.0	1.5	6.0
JULY	11.0	4.5	7.2
AUG	11.0	4.0	7.9

Fifteenmile Creek
(At Lower Site)

MAY(28-31)	9.5	5.5	7.4
JUNE	17.5	5.0	10.9
JULY	18.0	9.5	13.1
AUG	17.5	10.0	13.7
SEPT	17.0	8.0	12.6

Eightmile Creek
(At Upper Site)

JULY	10.0	3.5	6.3
AUG	10.5	2.5	7.3
SEPT	11.5	2.0	
OCT	7.0	.05	3.3

Eightmile Creek
(At Lower Site)

SEPT(16-20)	11.0	7.0	-
OCT	9.5	3.2	

1987 TEMPERATURE DATA CONT.

Ramsey Creek
(At Lower Site)

MONTH	MAX	MIN	AVE
MAY(27-31)	9.5	5.5	7.4
JUNE	15.0	4.5	9.9
JULY	15.5	8.0	11.0
AUG(1-10)	14.5	8.0	11.2

Ramsey Creek
(At Upper Site)

JUNE	6.5	3.8	4.4
JULY	7.8	3.5	5.3

Fivemile Creek

MAY(27-31)	9.0	6.5	7.8
JUNE	15.5	5.5	10.4

1986 TEMPERATURE DATA

Fifteenmile Creek
(At Upper Site)

MONTH	MAX	MIN	AVE
JUNE(26-30)	8.0	5.0	6.7
JULY	9.0	3.0	6.5
AUG	10.5	6.5	8.7
SEPT	9.5	4.0	6.4

Fifteenmile Creek
(At Lower Site)

AUG	16.0	13.0	14.8
SEPT(1-16)	13.0	11.0	11.7

Eightmile Creek
(At Upper Site)

MAY(24-31)	6.8	3.5	-
JUNE	8.5	3.5	
JULY	8.5	3.5	-
AUG	9.2	5.0	
SEPT	8.5	3.0	-

Eightmile Creek
(At Lower Site)

JUNE	14.5	6.0	
JULY	19.0	7.0	
AUG(25-31)	17.5	10.0	-
SEPT(1-13)	14.5	3.5	

1986 TEMPERATURE DATA CONT.

Ramsey Creek
(At Upper Site)

MONTH	MAX	MIN	AVE
MAY(23-31)	8.0	6.0	-
JUNE	8.0	6.0	
JULY(1-11)	8.0	6.0	
AUG	11.0	7.5	
SEPT	10.5	6.0	-

Ramsey Creek
(At Lower Site)

JUNE(26-30)	13.0	8.0	-
JULY(1-16)	14.5	8.0	-

Fivemile Creek

JUNE(2-6)	12.5	-	
JULY	15.0	9.0	-
AUG(1-20)	17.0	11.0	-

1987 SPAWNING SURVEYS

Fifteenmile Creek

Date	Distance Surveyed	Water temp Air temp	Visi- bility	flow	weather	# redds	Adults	Comments
4/5	Below 4421 bridge to 0.5 miles above USFS Boundary.	42°F 68°F	1	mod to low	C	7	1	2 redds on Forest 1 fish .5 mi. below boundary
4/21	4421 xing to USFS Boundary.	44°F 68°F	1	mod	C	-	-	juvenile trout seen
4/28	4421 xing to 1 mile above USFS Boundary.	45°F 57°F	1	mod	C	4	2	2 redds above the boundary

Ramsey Creek

4/5	USFS Boundary to 190 xing.	40°F 85°F	1	low	C	1	-	
4/21	"	41°F 69°F	1	mod	C	-	-	juvenile trout seen
4/29	"	48°F 66°F	1	mod	C	1	-	same redd

Eightmile Creek

4/20	1 mile below USFS Boundary.	39°F 57°F	1	mod	C			juvenile trout seen
4/29	"	45°F 57°F	1	mod	C			

KEY: Visiblity- 1 = Can see well into pools and riffles Weather - C = Clear

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